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in Tarapacá and other nitrate regions. There is a long section describing the industrial methods employed in developing the nitrate deposits, the rate of production, and the uses of nitrate of soda. The final paragraph describes the nitrate deposits in other parts of the world.

Regarding the origin of the nitrates the author concludes that they were produced mostly from nitrogenous animal matter in old guano beds which once lined the waters of the interior basin. The guano deposits are assumed to have been formed as border accumulations during the time that the nitrate pampa was a part of the ocean floor and also during the later period when elevation of the region transformed it into an open bay or gulf and finally into an enclosed sea. In this view erosion is responsible for the disappearance of the guano since the leaching which gave rise to the concentrated nitrate. The occurrence of the nitrate in the form of sodium nitrate is attributed to the abundance of sodium salts in the region. Common salt was deposited upon the final evaporation of the waters of the enclosed sea. It is granted that a small amount of the nitrate may have been derived from the decay of marine and land vegetation about the borders of the tract. To the decay of marine plants is also attributed most of the iodine associated with the nitrate. The borates in the deposits are thought to have been derived from boron-bearing minerals and from springs carrying boron compounds. While these conclusions appear plausible the author admits that a vast amount of geological and chemical details must yet be worked out before the subject can be fully understood. ISAIAH BOWMAN.

Traité de Géographie physique. Par Emmanuel de Martonne. Completed in 4 parts. 1—Climat; 2—Hydrographie; 3—Relief du Sol; 4—Biogéographie. Parts 1 and 2, 412 pp., Photographs, Maps, Diagrams and Bibliographies. Librairie Armand Colin, Paris, 1909. 5 frs. a Part.

The author introduces this "Treatise on Physical Geography" with an interesting chapter on the evolution of the science from the geography of the ancients to that of the modern schools. On the basis of this review he proposes to define geography as the science of physical, biological and social phenomena, considered as to their distribution, their causes, and their mutual inter-relations.

The second chapter in the first part of the work discusses the form of the earth, its rotation and its revolution about the sun, and includes an interesting account of the effects which these physical phenomena have upon human conditions. Believing that no country is geographically known until a number of latitude and longitude determinations have made possible a proper map, and that the map is the basis of all geographic knowledge, the author devotes a chapter to a rather extended account of latitude and longitude determinations, including some description of the instruments used; and of the subject of map projections. He next presents a variety of miscellaneous matters under the title "the elements of physical geography." Here are treated such topics as the composition of the atmosphere, the distribution of lands and oceans, continental and oceanic reliefs, waves, tides and currents, terrestrial magnetism, internal heat of the earth, volcanoes and earthquakes, and the work of winds, streams, and glaciers.

Seven chapters are devoted to the subject of Climate. After a detailed account of the several factors of climate, in which are set forth the principal features of atmospheric temperature, pressure, and humidity, there follows a discussion of "weather types," including an account of the changes due to cyclonic movements of the atmosphere, and such special phenomena as the cold waves of North America and the southerly bursters of Australia. The "principal climatic types" are treated under the general heads: equatorial, tropical, and subtropical climates, temperate climates with cold season, warm and cold desert climates, cold climates with temperate season, and polar climates. These are further divided in the detailed treatment covering some fifteen pages, and their distribution is shown on a colored map. In discussing the subject of climatic changes, the author expresses his doubt as to the verity of progressive dessication within the historic period. A chapter on mountain climate follows. While reading this part of the work, one is continually disappointed at the author's failure to present an adequate account of the economic aspects of climate. After reading the opening chapters, one is prepared to find in Part II a much more thorough treatment of the effect of climate on man than the text includes.

The next section is entitled "Hydrography," and the introductory chapter deals with the forms and depths of ocean basins, the temperatures and salinity of ocean waters. Then follows an account of waves, tides, and currents.. In discussing gulfs and mediterranean seas, the features characteristic of the more important examples are set forth in some detail, and the treatment becomes regional rather than systematic, in contrast with the method employed in most of the text. The topographic features of lakes are briefly described; several pages are devoted to the question of lake origin, while the temperature and movements of lake waters, and the variations of lake levels are treated more fully. Young, mature, and old lakes are described; but the relation of lakes to stages of stream development is not emphasized. The remaining chapter deals with rivers, and is largely devoted to what may be denominated the regimen of streams. Springs are discussed, and their relation to stream action is pointed out; the conditions affecting stream volume are set forth, and a classification of streams based on conditions of alimentation is elaborated by means of type examples. Such topics as stream development, the characteristics of meandering streams, and the beneficial and harmful effects of stream action, are omitted; the treatment of hydrography must therefore be considered both incomplete and uneven.

The next section of the work deals with land forms. Only two chapters of this part appear in the parts here reviewed. The first presents an account of the methods of map making; here one misses illustrations of contour and hachure maps, which would add much to the value of the text. The figure (160) used to explain the principle of curved relief is misleading, because the transparent block diagram is so constructed as to show a down-curved surface, whereas the contours projected from it represent an up-curved surface. In the second chapter, a discussion of the methods of determining mean elevations and other elements of land forms is followed by certain general considerations as to the importance of stream erosion and of climate in producing topographic forms. The work of ice, wind, and waves is briefly touched upon, and the work of the weather more fully treated. Excellent illustrations, including block diagrams, aid the understanding of the text.

It is perhaps unfair to offer general criticism before all parts of a work have been reviewed. But we may properly sum up our impressions of the details of treatment in the first half of the work. The reader must congratulate the author for having brought together a great variety of interesting material, and for having presented it in a most readable text. The author's style is characteristically French in its clarity, and the few photographic illustrations are excellent. Among the errors which have crept into the text, one of the most noticeable appears in the explanation of the use of the pendulum to determine the form of the earth (Part I, page 34). In order to emphasize the fact that the force of gravity increases toward the poles and decreases toward the equator, the author states that 'the force of gravity increases as one approaches the centre of the earth, as has been proved by observations in mines;' whereas the reverse is the case. Probably the most serious criticism which should be offered is the markedly uneven treatment which mars the unity of the work. Some chapters place much emphasis on the economic aspects of physical features, while others practically ignore this phase of geography. Details of little geographic value encumber the text, and important topics are wholly omitted. These are unfortunate defects in a work which is excellent in most other respects. D. W. JOHNSON.

In Wildest Africa. The Record of a hunting and exploration trip through Uganda, Victoria Nyanza, the Kilimanjaro region and British East Africa, with an account of the ascent of the snowfields of Mount Kibo, in East Central Africa, and a description of the various native tribes. By Peter MacQueen. xiii and 402 pp., 64 plates from original photographs, map, bibliography and index. L. C. Page & Company, Boston, 1909. $3.

From the geographical point of view this is one of the best of the African hunting books because it gives so much good and accurate information about the east and central regions in which the author travelled. The incidents of the chase are numerous and varied enough to satisfy any Nimrod; and the various tribes, their lives and homes, and East tropical Africa under the white régime, are so well described that the book may be recommended to all readers both as entertaining and as edifying. To be sure, a little slip occurs, now and then. Victoria Nyanza may be said by the most recent surveyors to be larger than Lake Superior, but they are mistaken. The illustrations are excellent and most of them were taken by Mr. Peter Dutkewich, the author's companion.

Zur Meteorologie von Peru. Von J. Hann. Aus den Sitzungsberichten der K. Akad. der Wissens. in Wien. Mathemnaturw. Klass. Bd. CXVIII. Abt. II a., 90 pp., Wien, Nov., 1909.

With his characteristic skill and thoroughness, Dr. Hann has compiled and analyzed the meteorological records obtained at the various Peruvian stations of the Harvard Observatory during the years 1888-1895. The establishment of these stations was described, and the data obtained at them were published in the *Annals* of the Astronomical Observatory of Harvard College, Vol. XXXIX, Parts I and II and Vol. XLIX, Parts I and II, but the numerical results have never been subjected to mathematical analysis, and as originally printed left much to be desired. No one in the world was better fitted than Dr. Hann to undertake this task. He has critically studied the various more or less broken series of observations; has discovered and corrected various errors, and has obtained results which are full of interest and importance for the meteorology of Peru. The present monograph is distinctly meteorological rather than climatological; the methods of reduction and of computation are rigidly mathematical. Yet the